

16.1

Parametric Equations

$$x = f(t)$$

$$y = g(t)$$

t - common parameter

graphs - may not be functions

used for 2D motion

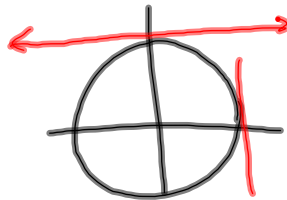
$$x = \cos t$$

$$y = \sin t$$

$$\frac{dy}{dx} = \frac{\cos t}{-\sin t}$$

$$\left. \frac{dy}{dx} \right|_{t=0} = *$$

$$\boxed{\frac{dy}{dx} = \frac{dy/dt}{dx/dt}}$$



$$\left. \frac{dy}{dx} \right|_{t=\pi/2} = \frac{0}{-1} = 0$$

Mar 1-12:23 PM

$$\boxed{\frac{d^2y}{dx^2} = \frac{\frac{d}{dt}\left(\frac{dy}{dx}\right)}{dx/dt}}$$

$$x = \cos t$$

$$y = \sin t$$

$$\frac{dy}{dx} = \frac{\cos t}{-\sin t}$$

$$\frac{d^2y}{dx^2} = \frac{-\sin t(-\sin t) - \cos t(-\cos t)}{(-\sin t)^2}$$

$$\frac{d^2y}{dx^2} = \frac{\sin^2 t + \cos^2 t}{\sin^2 t (-\sin t)} = \frac{1}{-\sin^3 t}$$

$$= -\csc^3 t$$

Mar 1-12:37 PM

$$\begin{aligned}x &= \cos^3 t \\ y &= \sin^3 t\end{aligned}$$

astroide

Mar 1-12:44 PM